AGE AND SIZE COMPOSITION OF THE MENHADEN CATCH ALONG THE ATLANTIC COAST OF THE UNITED STATES, 1959

WITH A BRIEF REVIEW OF THE COMMERCIAL FISHERY

by William R. Nicholson and Joseph R. Higham, Jr.

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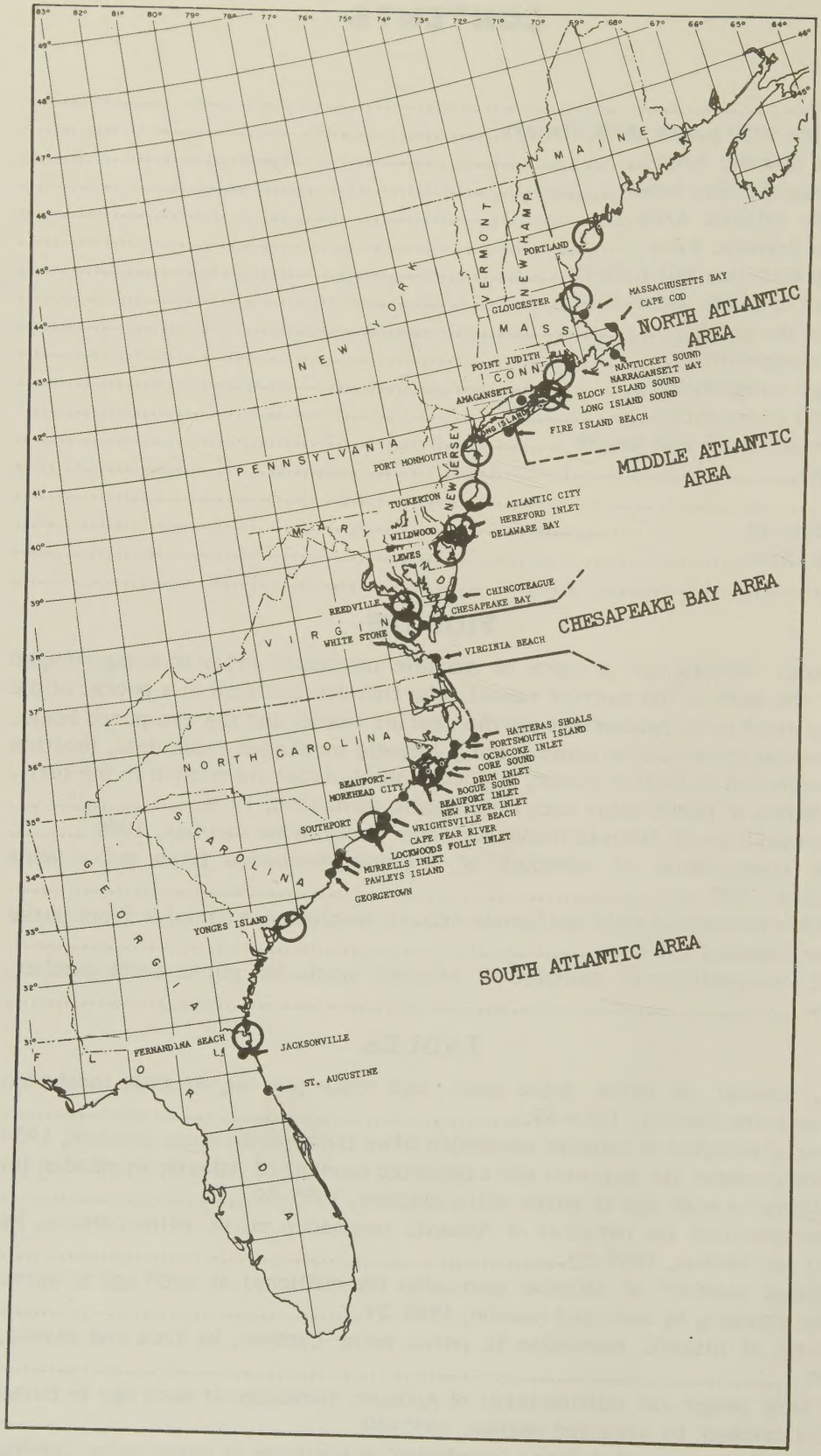

Figure 1.--Map showing areas used in summarizing Atlantic menhaden catch data, location of menhaden reduction plants, and location of places mentioned in the text.

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ABSTRACT

There were 705,000 tons of Atlantic menhaden *(Brevoortia tyrannus)* caught during the 1959 purse seine fishery with 614,000 tons taken during the summer fishery and 91,000 tons during the North Carolina fall fishery. This was the second largest catch in the period 1955-59. The number of purse seine sets (33,099) also reached a record in the same 5-year period. The mean catch per set (21 tons) was the same as in 1958, when the smallest catch (551,000 tons) in 5 years was taken.

The near-record catch was primarily the result of two exceptionally large year classes. The 1958 year class (age-1 fish) constituted 91 percent of the catch in the South Atlantic Area, 90 percent in the Chesapeake Bay Area, and 58 percent in the Middle Atlantic Area. The 1956 year class accounted for 58 percent of the catch in the North Atlantic Area and 58 percent in the North Carolina fall fishery. Mean length and weight of age-1 fish in all areas was the smallest in 5 years. Summer catches in all areas comprised fish which, on the average, were smaller than in previous years. Catches in the North Carolina fall fishery comprised fish that were larger than in previous years, the increase being due primarily to the absence of age-0 fish in the catches.

INTRODUCTION

Purse seine catches of Atlantic menhaden *(Brevoortia tyrannus)* have been sampled each year since 1955 as part of the biological investigations being conducted by the Bureau of Commercial Fisheries. Sampling was designed to measure age, size, and sex composition to determine if changes in catch were related to changes in fishing effort or fish abundance (June and Reintjes, 1959).

This report, the fifth of a series, reviews the 1959 purse seine fishery and summarizes the catch-sampling data. As in previous reports, the summer fishery is reviewed and summarized by four geographical areas (fig. 1), while the North Carolina fall fishery is

treated separately. The catch, number of purse seine sets, catch per set, and summaries of the number, age, length, weight, and sex of Atlantic menhaden in the catches are included. Unusual or significant aspects of the 1959 fishery are discussed.

REVIEW OF THE 1959 PURSE SEINE FISHERY

The Atlantic menhaden purse seine catch in 1959 was 705,000 tons (Power, 1961), only 35 tons less than the record catch of 1956. An increase over the catch of 1958 was recorded for every major area (table 1). In the "summer" fishery (late April to early November) 614,000 tons were landed, 45 tons less than the 1956 record. In the North Carolina "fall" fishery (mid-November to mid-January), 91,000 tons were landed, 10,000 more than the record in 1956.

There were 33,099 purse seine sets made, a record for the 5 years, 1955 to 1959 (table 1). The number of sets increased over that in 1958 in every area in the summer fishery, but decreased in the North Carolina fall fishery. For the third consecutive year, the number of sets increased in the Chesapeake Bay Area and reached a maximum of 11,214 sets in 1959. This was 2,449 more than the previous record of 8,765 in 1958. The mean catch per set (21 tons) was slightly greater than in 1957, but slightly less than in 1958. The mean catch per set in the summer fishery (20 tons) was greater than in 1958 in all except the Middle Atlantic Area, and was greatest for the 5-year period in the North Carolina fall fishery (46 tons).

The number of vessels in the summer fishery was 129, an increase of 13 above the number in 1958, but 4 less than the record number in 1957. There were 55 vessels in the North Carolina fall fishery, 6 less than in 1958 and 8 less than in 1957.

South Atlantic Area

The first purse seine catches of the 1959 season were made on April 29 by three vessels fishing off Jacksonville, Fla. Landings were light until large schools of fish were located off St. Augustine, Fla., on May 4. From then until near the end of May, when high winds and heavy seas interrupted fishing, large catches were made. Landings during the month amounted to 7,200 tons, the bulk of which was taken off Fernandina Beach, Fla. In June, schools were moderately abundant, and 7,900 tons were taken in the vincinity of Fernandina Beach. Adverse weather restricted fishing in July, and the catch amounted to only 2,300 tons. Fishing remained poor during the remainder of the summer, and four vessels stopped fishing on September 8. Sporadic fishing was done by three vessels in the Fernandina

TABLE 1.--Catch, number of purse seine sets, and catch per set, Atlantic menhaden purse seine fishery, 1955-59

Season and area	Catch					Fishing activity					Average catch per purse-seine set				
	1955	1956	1957	1958	1959[2]	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
SUMMER FISHERY	*Thousand tons*					*Number of sets*[2]					*Tons*				
South Atlantic	48	73	38	47	75	2,526	3,042	2,375	3,615	5,187	19	24	16	13	15
Chesapeake Bay	153	89	118	149	194	5,667	6,357	8,428	8,765	11,214	27	14	14	17	17
Middle Atlantic	328	402	342	232	281	13,120	14,358	15,545	8,286	12,060	25	28	22	28	23
North Atlantic	83	95	78	34	64	2,862	2,714	3,250	1,619	2,712	29	35	24	21	24
Subtotal	612	659	576	462	614	24,480	26,360	30,316	22,000	30,854	25	25	19	21	20
FALL FISHERY															
North Carolina	73	81	56	78	[3]91	1,872	2,531	1,474	2,438	1,974	39	32	38	32	46
Total	685	740	632	540	705	26,346	28,462	31,600	24,545	33,099	26	26	20	22	21

[1] Source: Fishery Statistics of the United States, 1959. By Edward A. Power, U. S. Fish and Wildlife Service, Statistical Digest No. 51, 457 pp.

[2] Slight discrepancies in numbers as given in previous reports and in subtotals and totals due to rounding off of figures.

[3] The North Carolina fall fishery normally extends into January, therefore, catch total includes January 1960, but not January 1959. Seasonal breakdown of the catch obtained from U. S. Fish and Wilflife Service. C.F.S. Nos. 2247 and 2252.

Beach area until October 15. Total landings in this locality amounted to 22,000 tons.

One plant started operating at Yonges Island, S.C., on May 18. Fishing was poor, however, and the plant closed on August 20. Only 2,000 tons were landed by four vessels.

Fishing began in North Carolina waters on May 4 when eight vessels from Southport made moderate landings off Lockwoods Folly Inlet and the mouth of the Cape Fear River. On May 27, several large schools were found between Georgetown and Murrells Inlet, S.C. Over 3,500 tons of these fish were caught, mostly in the vicinity of Pawleys Island and Murrells Inlet. Schools became scarce in July, and catches through the remainder of the summer were light. Fishing by the Southport fleet ended on October 3.

Eleven vessels from Beaufort, N.C., began fishing on May 7. Landings reached a peak in July when over 3,400 tons were landed. Fishing continued in Bogue and Core Sounds until October 22. There was little fishing in ocean waters in this locality during the entire summer, but on November 2, young-of-the-year (age-0) fish appeared simultaneously in ocean waters off Ocracoke Inlet, N.C., and Portsmouth Island, N.C. Scattered catches of these fish were made in early November. The last landing of the summer season was made on November 7.

Total summer landings in the South Atlantic Area were 75,000 tons, 2,000 tons more than the previous record in 1956. The largest share of the summer catch was made in June (35 percent), followed by May (21 percent), July (19 percent), August (14 percent), and April (less than 1 percent). The mean catch per set was 15 tons, 2 less than the 5-year mean of 17.

Chesapeake Bay Area

The first catches of the 1959 season in Chesapeake Bay were made on May 25 by a fleet of 29 vessels. Landings within the Bay were relatively large through the summer and were augmented by good fishing off Chincoteague and Virginia Beach, Va. During October, adverse weather restricted the vessels to the upper Bay, and catches were markedly reduced. Twenty-two vessels terminated fishing on October 29. The remaining seven vessels continued fishing until November 9, when the last catches were made off Virginia Beach.

Total landings by the Chesapeake Bay vessels were 194,000 tons, an increase of 41,000 tons over the record of 153,000 tons in 1955. Landings during August accounted for 25 percent of the season total, while September, June, July, October, and May, respectively, accounted for 21, 19, 18, 11, and 6 percent. The mean catch per set was 17 tons, the same as in 1958.

Middle Atlantic Area

Fishing began in the Middle Atlantic Area on May 19. At that time, small, scattered schools were located between Chincoteague, Va., and the mouth of Delaware Bay. Landings were small until May 29 when schools became abundant along the northern New Jersey coast and the western end of Long Island, N.Y. Landings in June totaled over 71,000 tons. During July and August, schools continued to be abundant off southern New Jersey from Hereford Inlet to Atlantic City, N.J. During the first week in October, larger, older fish began congregating along the southern shore of Long Island, but they disappeared abruptly on October 17, Fishing terminated in the area on October 21.

The purse seine catch in the Middle Atlantic Area amounted to 281,000 tons as compared with 402,000 tons in 1956, 342,000 tons in 1957, and 235,000 tons in 1958. The largest catch was made in June (26 percent), followed by August (25 percent), July (22 percent), September (16 percent), October (8 percent), and May (3 percent). The mean catch per set was 23 tons, slightly less than the 5-year average of 25 tons.

North Atlantic Area

The first landing was made on May 29 by a vessel from Point Judith, R.I. Three additional vessels joined the Point Judith fleet during the first week of June. Ten vessels from Amagansett, N.Y., commenced fishing on June 13, followed by seven vessels from Gloucester, Mass., on June 21. During the first week in July, eight additional vessels were added to the Gloucester fleet. On July 10, a single vessel

began fishing in the vicinity of Portland, Maine. All vessels from Gloucester, Point Judith, and Portland were small-to-medium-sized otter trawlers that had been outfitted for purse seining during the summer months.

The Amagansett fleet operated off Southern Long Island during June and July. Foggy weather restricted fishing during the latter part of June, and catches were small. Weather during July, however, was fair, and excellent catches were made. When the schools disappeared from this locality in late July, the fleet shifted to Nantucket Sound. Fish were reported scattered and difficult to capture in this locality, and catches were small. During the second week in August, schools began concentrating in Block Island Sound. The largest landings of the season were made in this locality during the remainder of the month by the Amagansett and Point Judith fleets. Schools became scattered again during September, and vessels scouted from Cape Cod to eastern Long Island Sound. In early October, the fleet concentrated in the waters off eastern Long Island where fishing continued until October 21.

Early-season landings in Narragansett Bay by the Point Judith fleet were relatively light. The largest landings of the season were made in July. In mid-August, the fleet shifted to Block Island Sound where good catches were made through the end of the month. Following the disappearance of schools in this locality, the fleet returned to Narragansett Bay where fishing continued until October 5.

The Gloucester fleet began fishing at the eastern end of Cape Cod, but landings were small, and the fleet shifted to Massachusetts Bay during the first week. Adverse weather restricted fishing during July. In August, the weather improved, schools became more abundant, and catches increased in both Nantucket Sound and Massachusetts Bay. In late July, the vessels moved into Nantucket Sound, where fishing was concentrated through the first 3 weeks in August. During the last week in August, fishing shifted to Boston Bay, but the schools disappeared during the following week, and the vessels returned to Nantucket Sound where they continued fishing for the remainder of the season. With the exception of the first week of September, landings were small during the remainder of the season, and termination of fishing by most of the vessels occurred on September 19. A single vessel, however, continued to make occasional landings until October 17.

Schools were reported scarce in Maine waters during the entire season. Only four purse seine landings were recorded, three in July and one in August.

The purse seine catch in the North Atlantic Area was 64,000 tons. This was an increase of 29,000 tons over 1958. The greatest share of the catch was made in August (30 percent), followed by July (27 percent), September (24 percent), June (13 percent), October (5 percent), and May (1 percent). The mean catch per set was 24 tons, 3 less than the 5-year average.

North Carolina Fall Fishery

The North Carolina fall fishery commenced on November 12. Through November 20, fishing was intense between Drum and Ocracoke Inlets, but catches were small because of adverse weather. Following a 6-day tie up, 62 vessels resumed fishing on November 26 and continued to November 30, by which time the fish had moved to between Beaufort Inlet and New River Inlet. After the disappearance of the fish off New River Inlet on November 30, another large school appeared off Hatteras Shoals on December 2. Fishing was productive for 2 days and then was curtailed because of adverse weather through December 8. On December 9, large concentrations of fish were located between Beaufort and Wrightsville Beach. Excellent landings continued to be made from these large schools until they disappeared off New River Inlet on December 18.

The season ended on January 11 when the last landing was made off Beaufort Inlet. Over 91,000 tons were landed during the fall fishery. The mean catch per set was 21 tons.

DISTRIBUTION OF PURSE SEINE SETS

The calculated numbers of purse seine sets within 10-minute unit areas are shown in figure 2. Fishing occurred from the northern

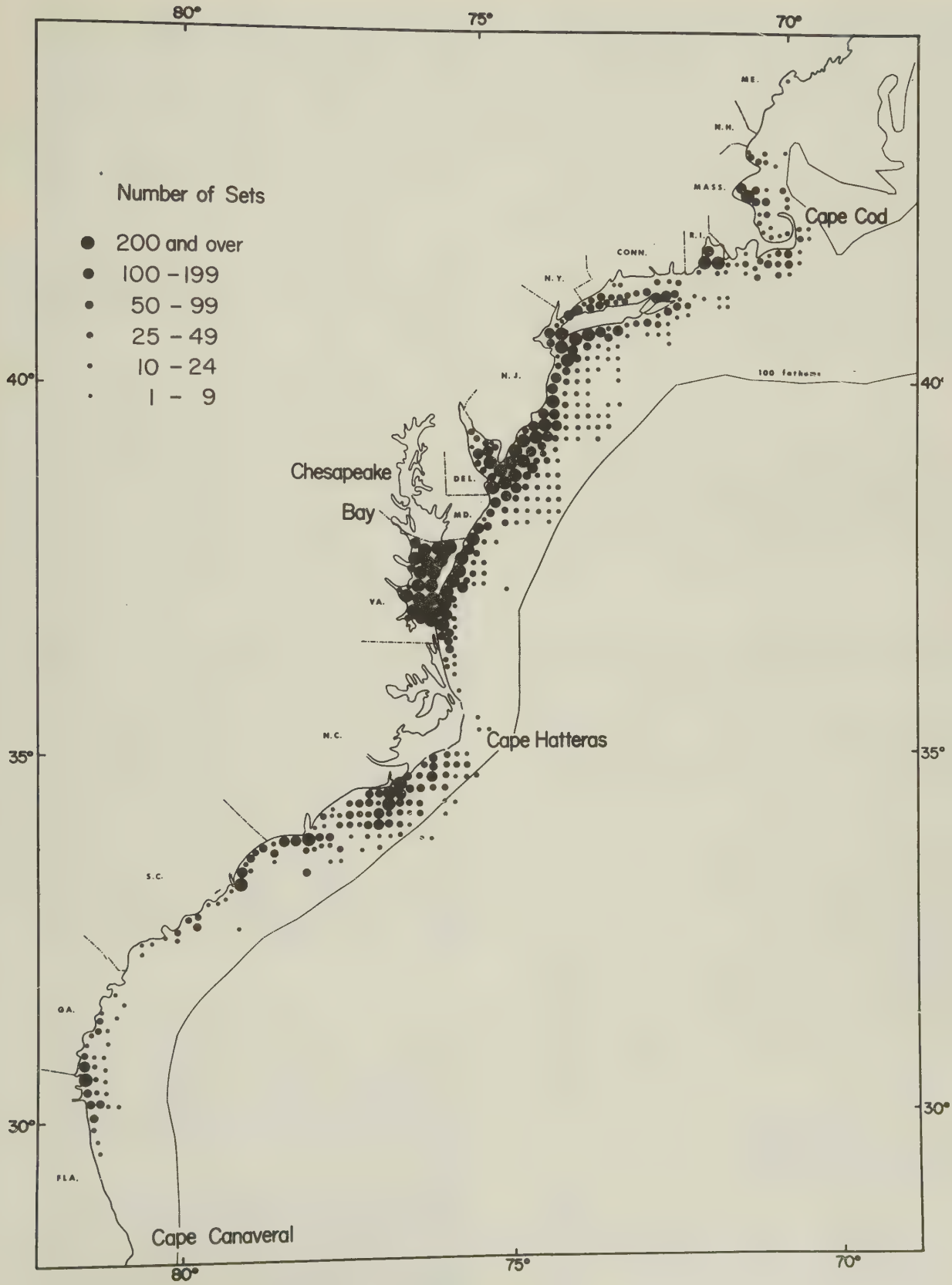

Figure 2.--Distribution of purse seine sets for Atlantic menhaden, 1959.

coast of Florida to the southern edge of the Gulf of Maine, with practically all sets being made inside the 100-fathom contour. As in previous years, the greatest fishing activity (200 sets or more) occurred in Chesapeake Bay and waters northward to the southern coast of Long Island. The number of sets increased over that in 1958 along the coast of northern Florida, southern Georgia, and Cape Cod. In the latter locality, however, there were fewer sets than in 1955 and 1956 and fishing did not extend as far northward. The number of sets in Delaware Bay was approximately the same as in 1957 and 1958.

SAMPLING OF THE CATCH

Sampling methods employed in 1959 followed those described by June and Reintjes (1959). The number of samples taken at the different locations is given in table 2. As in 1958, landings at Portland, Maine, were negligible, and no sample was taken. Fishing was resumed at Yonges Island, S.C., for the first time since 1955, but fishing was so sporadic that only four samples were obtained. The number of tons of fish landed per sample taken was 722 for the summer fishery and 1,569 for the North Carolina fall fishery.

TABLE 2.--Number of samples of Atlantic menhaden taken from purse seine catches, 1959

Season and locality	Samples
SUMMER FISHERY	
	Number
Fernandina, Fla.	55
Yonges Island, S.C.	4
Southport, N.C.	31
Beaufort, N.C.	37
Reedville, Va.	203
Lewes, Del.	131
Wildwood, N.J.	107
Port Monmouth, N.J.	113
Amagansett, N.Y.	134
Gloucester, Mass.	36
Subtotal	851
FALL FISHERY	
Beaufort-Morehead City, N. C.	58
Total	909

Age Composition

The percentage age composition and the calculated numbers of fish at each age in the purse seine catches from 1955 to 1959 are listed in table 3.

The record catch of 5.5 billion fish in 1959 was the result of an exceptionally strong year class in 1958. Age-1 fish accounted for 74.7 percent of the catch, the highest percentage for age-1 fish in the 5-year period. The calculated number of age-1 fish in the catch (4.1 billion) exceeded by over 2 billion the previous record in 1956 (2.1 billion). The catch of age-2 fish (1957 year class), in percent of catch and total numbers, was the lowest in the 5-year period (0.9 billion), while the catch of age-3 fish (1956 year class) was the highest in the 5-year period (0.4 billion). In 1958, the 1956 year class, as age-2 fish, set a record catch, both in numbers and percent of total catch. The catch of age-0 fish was the smallest in the 5-year period, due primarily to the abstention of fishing on this age group during the North Carolina fall fishery.

The percentage age composition of the catches in different areas for 1959 is shown in figure 3 and listed in table 4. The calculated numbers of fish in the different age groups are listed in table 5.

In the South Atlantic Area, the catch comprised only three age groups. Age-1 fish (1958 year class) ranked first (90.9 percent); age-2 fish (1957 year class), second (9.0 percent); and age-3 fish (1956 year class), third (0.2 percent). In combined numbers of fish, the catch almost equalled the recent record in 1956.

The catch of 2.28 million fish in Chesapeake Bay was almost twice the record in 1957. Age-1 fish (1958 year class) accounted for 90.1 percent, and age-2 fish (1957 year class) for 9.0 percent of the catch.

TABLE 3.--Age composition (in percent) and calculated number of Atlantic menhaden (in millions) at each age in purse seine catches, 1955-59

(Most numerous age group underscored)

AGE COMPOSITION

Year	Age									
	0	1	2	3	4	5	6	7	8-10	Total
1955 . . .	24.71	20.68	34.21	8.73	10.01	1.23	0.35	0.06	0.02	100.00
1956 . . .	1.00	57.16	25.97	9.61	1.26	4.18	0.67	0.12	0.02	99.99
1957 . . .	8.46	41.97	41.00	3.26	2.52	1.40	1.22	0.12	0.04	99.99
1958 . . .	3.81	30.85	60.93	2.72	0.62	0.56	0.32	0.17	+	99.98
1959 . . .	0.21	74.69	16.27	7.58	0.67	0.22	0.24	0.08	0.03	99.99

NUMBER OF FISH

1955 . . .	761.01	636.86	1,053.47	263.87	308.21	37.95	10.75	1.88	0.59	3,079.59
1956 . . .	36.37	2,072.95	941.71	348.42	45.60	151.49	24.38	4.47	0.88	3,626.27
1957 . . .	300.77	1,491.13	1,456.63	115.96	89.72	49.66	43.43	4.34	1.27	3,552.91
1958 . . .	106.06	858.29	1,694.99	75.75	17.31	15.61	9.01	4.69	0.10	2,781.81
1959 . . .	11.40	4,120.10	897.34	418.42	37.15	12.35	13.06	4.71	1.82	5,516.35

In the Middle Atlantic Area, age-1 fish (1958 year class) constituted the largest percentage (57.9 percent) of the catch for the first time in 5 years. In previous years, the highest percentage contribution by this age group was 22.2 percent in 1957. The percentage (30.3 percent) of age-2 fish (1957 year class) fell below 50 percent for the first time in 5 years. Age-3 fish (1956 year class) contributed the highest percentage (11.3 percent) since 1956. The percentage of older age groups continued to be negligible. In numbers of fish, the 1959 catch was the highest in the 5-year period and substantially above the previous high in 1957.

In the North Atlantic Area, the trend continued toward younger age groups. Age-1 fish (1958 year class) contributed a sizable portion (4.6 percent) of the catch for the first time in 5 years. Age-2 fish accounted for 21.1 percent; this was less than the contribution by age-2 fish in 1957 and 1958, but much higher than that in 1955 or 1956. Age-3 fish (1956 year class) dominated the catch (57.9 percent). This constituted the highest contribution by this age group in 5 years. The combined percentage of age groups older than age-3 continued to decline and was the lowest in 5 years. In numbers of fish, the catch was nearly twice that of 1958, but did not very markedly from the catches in 1955, 1956, and 1957.

In the North Carolina fall fishery, the most noticeable change in the age composition of the catch was the almost complete absence of age-0 fish. The reduction resulted from a decision by plant operators not to fish on this age group and did not reflect a change in relative abundance of this age group. The catch in 1959 ranked lowest for the 5-year period, 1955-59. It ranked second, however, when age-0 fish were deleted from the catches in previous years. The age composition of the catch in the North Carolina fall fishery (in percent) was nearly identical to the age composition (in percent) of the catch in the North Atlantic.

Length Composition

The length-frequency distributions of fish in samples from the purse seine catches in each area are shown in figure 4. (See also appendix 1-5).

The length-frequency distribution of the catch in the South Atlantic Area was similar to that in 1958. Lengths in 1959 ranged from

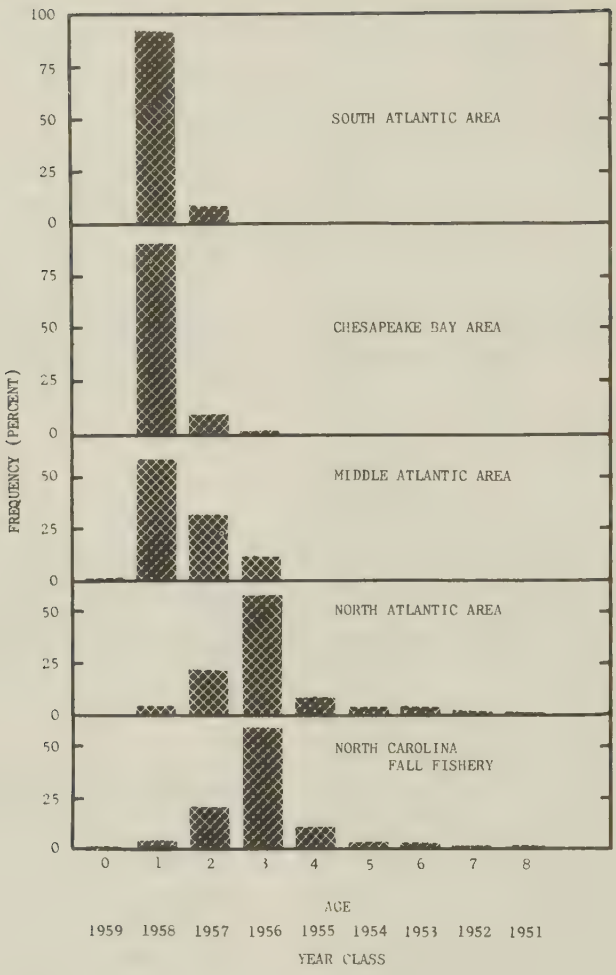

Figure 3.--Age composition of Atlantic menhaden from purse seine catches, 1959.

105 to 245 mm. The mode at 150 mm. reflected the preponderance of age-1 fish, and the positive skewness reflected the presence of age-2 fish.

Lengths in the Chesapeake Bay Area ranged from 110 to 250 mm. The dominant mode at 160 mm. resulted from the preponderance of age-1 fish. A secondary peak, representing age-2 fish, occurred at 210 mm.

The length-frequency distribution of the catch in the Middle Atlantic Area was bimodal and ranged from 130 to 355 mm. Peaks occurred at 175 mm. and 230 mm. and represented age-1 and age-2 fish, respectively. Age-3 fish constituted about 16 percent of the catch, but were not sufficiently numerous to create a third peak on the frequency distribution.

In the North Atlantic Area, three length groups (one major and two minor) were apparent in the frequency distribution. A dominant mode at 270 mm. represented age-2 and age-3 fish. Minor peaks at 205 mm. and 320 mm. represented age-1 and age-4-and-older fish, respectively.

The lengths of fish in samples from the North Carolina fall fishery ranged from approximately 115 to 360 mm. Because age-0 fish were taken in negligible numbers, there were fewer fish in the smaller size classes than in previous years.

Two important changes were apparent in the length-frequency distributions for 1959. First, in the North Carolina fall fishery, the smaller size classes contained fewer fish than in

TABLE 4.--Age composition (in percent) of Atlantic menhaden purse seine catches, by area and season, 1955-59

(Most numerous age group underscored)

Area, year and season	Age								
	0	1	2	3	4	5	6	7	8-10
SUMMER FISHERY									
South Atlantic:									
1955	1.66	65.22	27.02	3.32	2.77	--	--	--	--
1956	--	98.98	0.94	0.05	0.02	--	--	--	--
1957	3.65	32.47	63.76	0.12	--	--	--	--	--
1958	0.32	68.44	29.40	1.79	0.06	--	--	--	--
1959	--	90.90	8.95	0.15	--	--	--	--	--
Chesapeake Bay:									
1955	1.63	44.77	51.30	1.54	0.69	0.06	--	--	--
1956	--	90.91	9.02	0.07	--	--	--	--	--
1957	0.25	85.22	14.25	0.26	0.02	0.01	--	--	--
1958	0.04	46.32	53.01	0.50	0.08	0.04	--	--	--
1959	0.47	90.12	8.76	0.65	--	--	--	--	--
Middle Atlantic:									
1955	--	1.81	55.79	23.18	17.43	1.40	0.26	0.10	0.01
1956	--	14.78	63.96	18.08	1.44	1.41	0.26	0.06	0.01
1957	--	22.24	68.51	4.26	2.62	1.26	1.02	0.03	0.05
1958	--	2.54	95.08	2.21	0.12	0.03	0.02	--	--
1959	--	57.94	30.27	11.31	0.30	0.06	0.07	0.04	--
North Atlantic:									
1955	--	--	0.25	13.94	67.55	12.84	4.65	0.54	0.22
1956	--	--	6.41	36.35	8.22	40.96	6.42	1.29	0.36
1957	--	0.91	45.00	18.79	16.06	8.59	8.95	1.46	0.24
1958	--	0.16	52.58	24.47	8.43	6.75	5.13	2.36	0.11
1959	--	4.62	21.13	57.90	7.56	3.11	3.20	1.77	0.71
FALL FISHERY									
North Carolina:									
1955	87.19	3.61	6.00	0.86	1.96	0.32	0.04	--	0.01
1956	16.12	26.78	11.95	16.61	4.15	20.61	3.31	0.46	--
1957	74.20	3.24	6.08	4.07	5.40	3.84	2.89	0.25	0.02
1958	38.07	10.73	35.86	7.18	2.63	3.14	1.48	0.91	--
1959	0.39	3.84	20.11	58.00	10.30	3.21	3.40	0.44	0.30

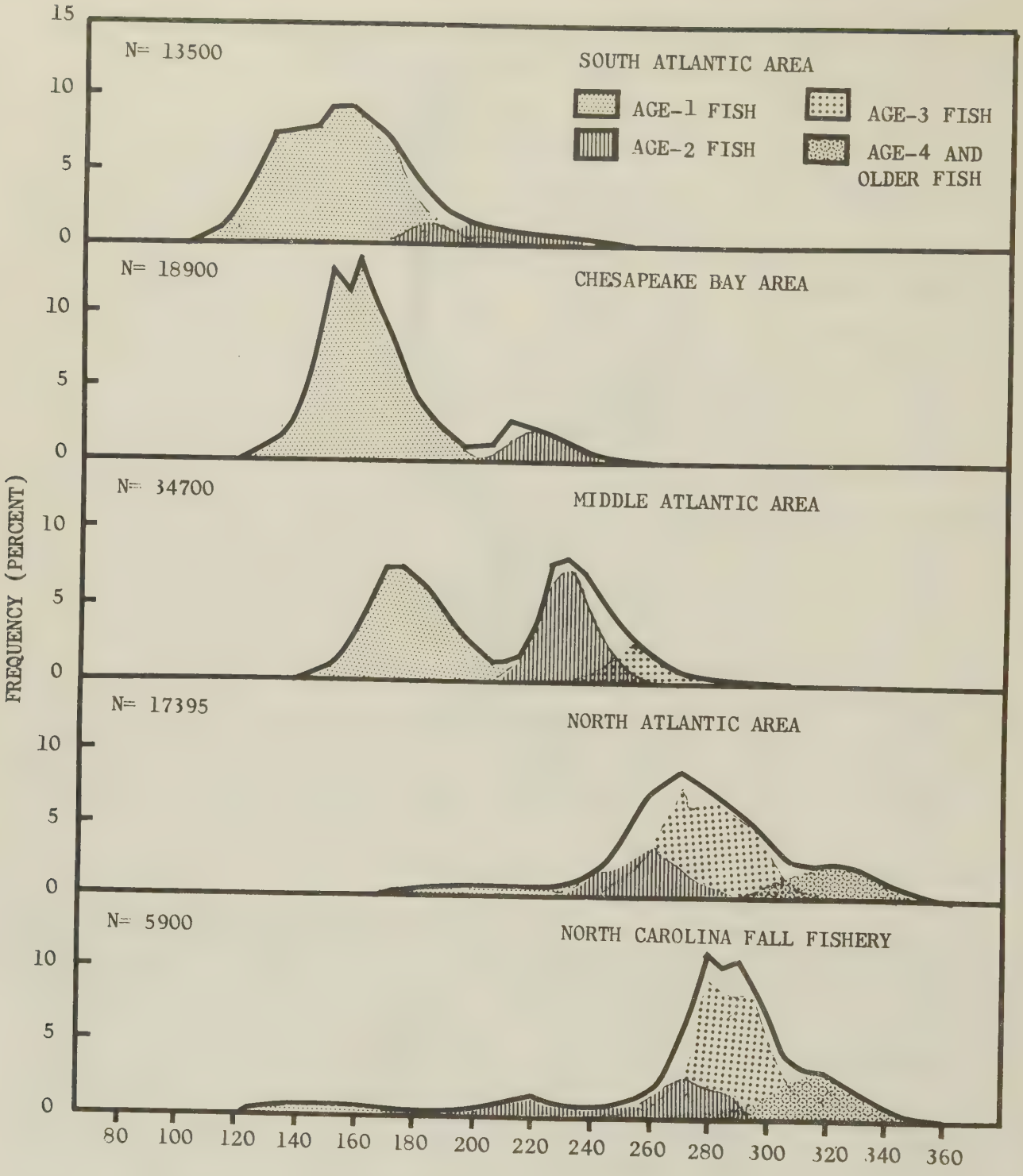

Figure 4.--Length composition of samples of Atlantic menhaden from purse seine catches, 1959.

previous years. This resulted primarily from the near complete absence of age-0 fish, but also from the decrease in numbers of age-1 fish, even though this age group dominated the summer fishery in the South Atlantic, Chesapeake Bay, and Middle Atlantic Areas. The second change was the shift to smaller size classes in the Middle Atlantic and North Atlantic Areas. The shift in the Middle Atlantic Area resulted from the dominance of age-1, rather than age-2, fish, as in previous years; and in the North Atlantic Area, from the greater numbers of age-1 fish as compared with previous years.

All of the features noted in the length-frequency distributions of previous years were present in the 1959 data. These have been discussed in other reports in this series (June and Reintjes, 1959, 1960; June 1961; June and Nicholson, 1964).

The length-frequency distributions of males and females are shown in figure 5. As in

TABLE 5.--Calculated number of Atlantic menhaden (in millions) at each age in purse seine catches, by area and season, 1955-59

(Most numerous age group underscored)

Area, year and season	Age									Total
	0	1	2	3	4	5	6	7	8-10	
SUMMER FISHERY										
South Atlantic:										
1955	6.51	255.20	105.74	13.01	10.83	--	--	--	--	391.29
1956	--	1,147.88	10.91	0.63	0.23	0.02	--	--	--	1,159.67
1957	13.27	117.91	231.56	0.42	--	--	--	--	--	363.16
1958	1.47	315.20	135.39	8.25	0.26	--	--	--	--	460.57
1959	--	1,051.86	103.53	1.72	--	--	--	--	--	1,157.12
Chesapeake Bay:										
1955	12.18	334.24	382.92	11.52	5.17	0.43	--	--	--	746.46
1956	--	674.37	66.90	0.49	--	--	--	--	--	741.76
1957	3.12	1,056.16	176.58	3.22	0.22	0.08	--	--	--	1,239.38
1958	0.48	490.88	561.76	5.25	0.90	0.39	--	--	--	1,059.66
1959	10.71	2,058.36	200.20	14.78	--	--	--	--	--	2,284.04
Middle Atlantic:										
1955	--	16.66	513.31	312.26	160.40	12.90	2.34	0.96	0.12	1,018.95
1956	--	190.28	823.35	232.82	18.60	18.19	3.31	0.71	0.13	1,287.39
1957	--	302.78	932.53	58.05	35.72	17.15	13.92	0.40	0.69	1,361.24
1958	--	22.73	850.63	19.75	1.07	0.31	0.17	--	--	894.66
1959	--	994.72	519.71	194.19	5.13	1.02	1.22	0.75	--	1,716.73
North Atlantic:										
1955	--	--	0.42	23.76	115.10	21.88	7.93	0.92	0.37	170.38
1956	--	--	13.58	77.00	17.41	86.78	13.59	2.73	0.75	211.84
1957	--	1.87	92.66	38.68	33.07	17.69	18.44	2.99	0.50	205.90
1958	--	0.14	49.13	22.87	7.88	6.31	4.80	2.21	0.10	93.44
1959	--	8.28	37.92	103.91	13.58	5.59	5.75	3.18	1.28	179.48
FALL FISHERY										
North Carolina:										
1955	742.32	30.76	51.08	7.32	16.71	2.74	0.39	--	0.10	851.42
1956	36.37	60.42	26.97	37.48	9.36	46.50	7.48	1.03	--	225.61
1957	284.39	12.41	23.30	15.60	20.72	14.74	11.07	0.95	0.08	383.26
1958	106.06	29.34	98.08	19.63	7.20	8.60	4.04	2.48	--	273.48
1959	0.69	6.87	35.99	103.81	18.44	5.75	6.09	0.78	0.54	178.96

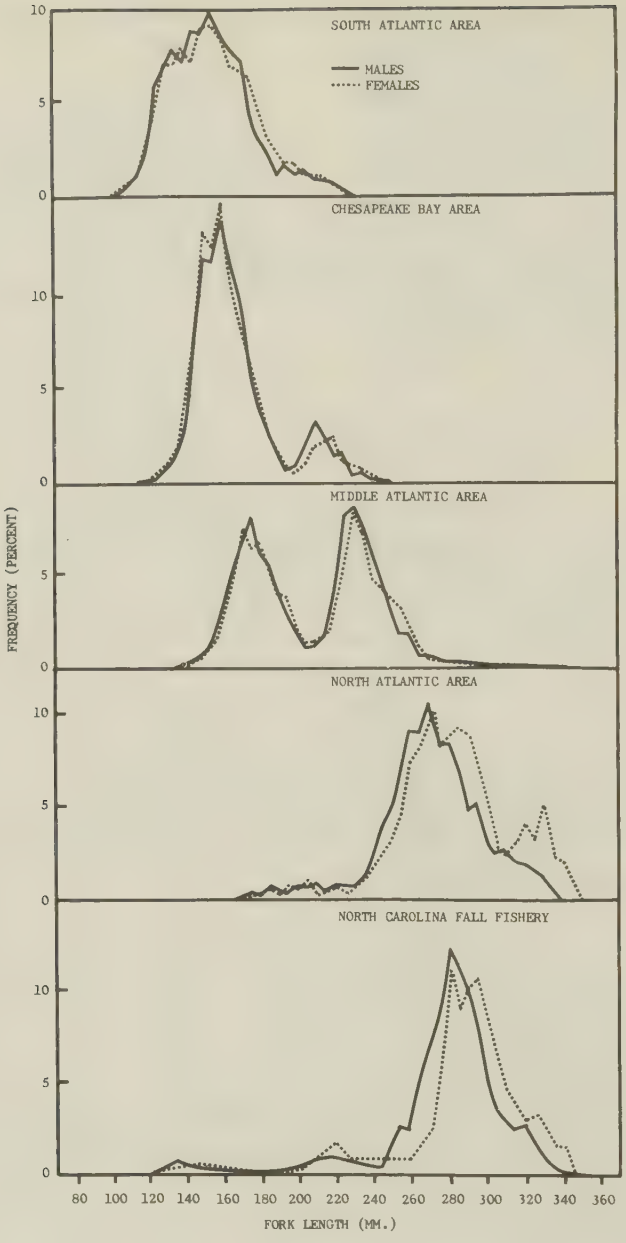

Figure 5.--Length frequencies of male and female Atlantic menhaden in samples from purse seine catches, 1959.

previous years, there was a size difference between the sexes. The ratio of females to males is given for each area in table 6. As in previous years (except 1958), females outnumbered the males in all except the South Atlantic Area.

Weight Composition

The weight-frequency distributions of fish in samples from the purse seine catches in 1959 are shown for each area in figure 6 (See also appendix tables 6-10).

TABLE 6.--Sex ratio of Atlantic menhaden in purse seine catches, by area and season, 1959

Area and season	Males	Females	Ratio of females to males
SUMMER FISHERY			
South Atlantic . .	1,238	1,231	.99
Chesapeake Bay . .	1,718	1,948	1.13
Middle Atlantic .	3,505	3,655	1.04
North Atlantic . .	1,524	1,825	1.19
FALL FISHERY			
North Carolina . .	538	605	1.12

The curves for the South Atlantic, Chesapeake Bay, and Middle Atlantic Areas were similar in that they were either unimodal or bimodal and positively skewed. The greater range in weights in the Middle Atlantic Area resulted from the presence of older age groups. in the North Atlantic Area and North Carolina fall fishery, the curves were similar and encompassed a wide range of weights, with no suggestion of a clear-cut mode.

Average Length and Weight

The mean lengths and weights of fish at each age, by sex, in the 1959 catches are shown in appendix tables 11-15. The mean lengths and weights for the past 5 years are summarized in tables 7 and 8.

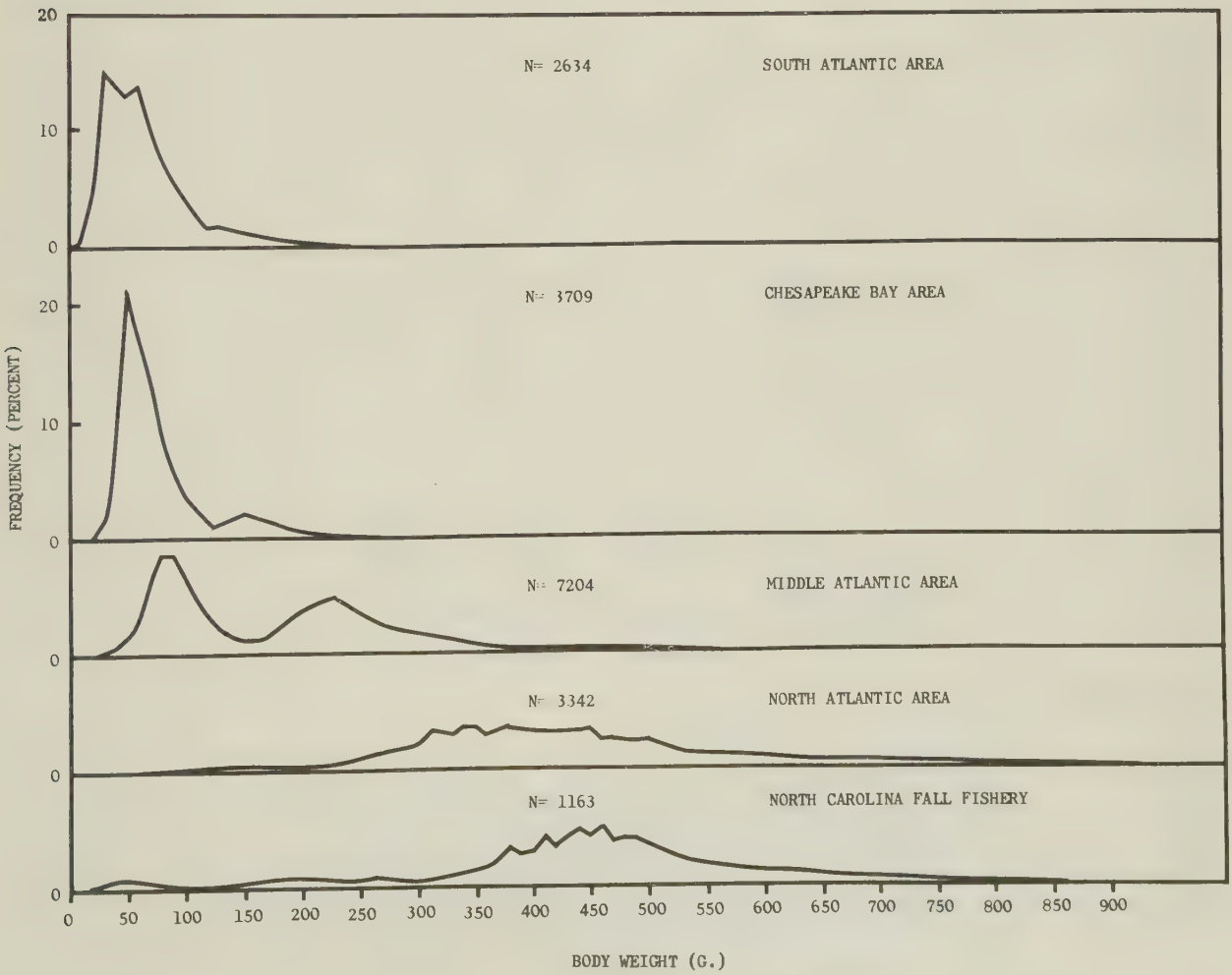

Figure 6.--Weight composition of samples of Atlantic menhaden from purse seine catches, 1959.

TABLE 7.--Mean fork length (in millimeters) of Atlantic menhaden at each age in purse seine catches, by area and seasin, 1955-59

(Most numerous age group underscored)

Area, year and season	Age											Mean
	0	1	2	3	4	5	6	7	8	9	10	
SUMMER FISHERY												
South Atlantic:												
1955	128	168	195	208	212	--	--	--	--	--	--	177
1956	--	159	198	214	224	234	--	--	--	--	--	160
1957	129	167	190	218	--	--	--	--	--	--	--	180
1958	132	168	190	202	211	--	--	--	--	--	--	175
1959	--	153	199	218	--	--	--	--	--	--	--	158
Chesapeake Bay:												
1955	152	199	236	244	251	242	--	--	--	--	--	219
1956	--	187	222	293	--	--	--	--	--	--	--	191
1957	158	180	221	223	267	252	--	--	--	--	--	186
1958	118	189	213	230	307	311	--	--	--	--	--	202
1959	155	162	215	234	--	--	--	--	--	--	--	169
Middle Atlantic:												
1955	--	228	259	279	290	300	314	333	310	--	--	274
1956	--	221	252	286	302	311	317	321	332	--	--	264
1957	--	200	240	279	309	314	317	306	324	327	--	240
1958	--	214	239	253	300	313	323	--	--	--	--	239
1959	--	180	234	255	308	302	319	327	--	--	--	211
North Atlantic:												
1955	--	--	277	287	301	316	323	330	336	347	344	303
1956	--	--	277	290	307	315	322	328	336	340	--	306
1957	--	218	266	292	309	317	321	322	321	332	--	295
1958	--	223	255	292	310	321	328	330	344	--	--	281
1959	--	210	260	280	312	320	328	333	339	335	--	280
FALL FISHERY												
North Carolina:												
1955	123	209	259	282	304	317	321	--	338	--	--	215
1956	118	182	262	298	308	312	318	325	--	--	--	253
1957	129	181	285	302	314	319	322	323	334	--	--	269
1958	116	202	264	304	315	324	328	330	--	--	--	244
1959	141	177	262	290	312	323	327	331	341	--	--	283

TABLE 8.--Mean weight (grams) of Atlantic menhaden at each age in purse seine catches, by area and season, 1955-59

(Most numerous age group underscored)

Area, year and season	Age											Mean
	0	1	2	3	4	5	6	7	8	9	10	
SUMMER FISHERY												
South Atlantic:												
1955	35	82	125	155	157	--	--	--	--	--	--	98
1956	--	67	134	176	217	224	--	--	--	--	--	69
1957	32	83	117	190	--	--	--	--	--	--	--	102
1958	40	84	120	143	157	--	--	--	--	--	--	96
1959	--	62	138	179	--	--	--	--	--	--	--	70
Chesapeake Bay:												
1955	60	142	222	262	278	235	--	--	--	--	--	185
1956	--	118	196	388	--	--	--	--	--	--	--	125
1957	--	97	171	181	257	327	--	--	--	--	--	108
1958	28	119	162	214	469	480	--	--	--	--	--	142
1959	66	70	164	204	--	--	--	--	--	--	--	81
Middle Atlantic:												
1955	--	225	317	404	457	505	596	712	543	--	--	385
1956	--	206	305	448	522	582	629	643	688	--	--	359
1957	--	149	257	429	589	608	621	535	630	634	--	270
1958	--	183	260	319	506	578	617	--	--	--	--	262
1959	--	100	231	314	543	531	599	606	--	--	--	181
North Atlantic:												
1955	--	--	401	426	494	589	641	691	732	760	774	514
1956	--	--	395	444	521	565	615	658	725	766	--	522
1957	--	190	352	471	566	607	638	660	706	612	--	497
1958	--	181	317	493	588	661	693	711	833	--	--	448
1959	--	169	331	421	583	631	684	720	750	740	--	429
FALL FISHERY												
North Carolina:												
1955	31	166	356	460	566	648	690	--	806	--	--	256
1956	28	116	346	516	563	582	642	643	--	--	--	373
1957	35	94	452	540	606	636	646	664	784	--	--	450
1958	26	155	360	573	668	722	741	756	--	--	--	344
1959	46	107	343	466	586	642	678	703	737	--	--	449

The mean length of fish in all areas except the North Carolina fall fishery, and the mean weight of fish in all areas except the South Atlantic Area and North Carolina fall fishery, declined sharply and were the smallest in the 5-year period. This decline resulted from the increase of age-1 fish in the catches. The mean length and weight of fish in the North Carolina fall fishery were the highest in the 5-year period. This increase was due to the almost complete absence of age-0 fish in the catch. Age-1 fish were smaller, lighter, and more abundant in 1959 than in any of the previous 4 years. Also, fish in each age group increased in size and weight from south to north. Those caught in the North Carolina fall fishery were generally larger and heavier than those caught in the summer fishery.

DISCUSSION

Increased exploitation of younger and smaller fish was suggested as a possible cause for the continued decline in yield of Atlantic menhaden in those areas dependent on older age groups (June and Nicholson, 1964). In the 1959 summer fishery, a greater number of fish was landed than in any previous year, yet the total yield was 45 tons less than in 1956, the record year for tonnage landed. The 1959 catch in all except the North Atlantic Area comprised mostly age-1 fish. In the South Atlantic and Chesapeake Bay Areas, record catches were landed, but in the Middle Atlantic Area, where normally the catch is composed mostly of age-2 fish, the yield of 281,000 tons was the second largest in the past 5 years and 121 tons less than the record in 1956. In the North Atlantic Area, the catch, which usually comprises age-3 and older ages, consisted mostly of age-3 and younger ages in 1959. It was next to the smallest in the past 5 years.

The number of purse seine sets reached a new high in 1959 in the South Atlantic and Chesapeake Bay Areas, but was next to the smallest in 5 years in both the Middle Atlantic and North Atlantic Areas. The record tonnages in areas exploiting primarily age-1 fish, in a year when record numbers of fish were landed, further suggests over-exploitation of the younger age groups.

The 1958 year class undoubtedly is one of the largest in recent years, and as age-2 fish should provide record catches in the Middle Atlantic and possibly the North Atlantic Areas in 1960. In view of the unprecedented exploitation of this year class at age-1, however, the 1961 catches, while expected to be high, probably will fall short of the record set in 1956.

The North Carolina fall fishery, in contrast to the summer fishery, set a new record tonnage in 1959, but the number of fish caught was less than in any of the preceding 4 years. The decrease in numbers resulted from the almost complete absence of age-0 fish (purposely not exploited) and from smaller catches of age-1 and age-2 fish. Fishing was negligible in January because age-0 fish were not exploited. Consequently, nearly all fishing occurred in November and December. The record yield, which comprised mainly age-3 and older fish, and the larger number of sets were further evidence that weather, rather than abundance, is the factor limiting the catch in the North Carolina fall fishery.

SUMMARY

1. The 1959 purse seine catch of Atlantic menhaden *(Brevoortia tyrannus)* was 705,000 tons, the second largest in the history of the fishery. Landings in the summer fishery amounted to 614,000 tons; in the North Carolina fall fishery, 91,000 tons. The number of purse seine sets amounted to 33,009, the largest in the 5-year period, 1955-59. The average catch per set (21 tons) was slightly greater than in previous years. It was smallest in the South Atlantic Area and greatest in the North Carolina fall fishery. The greatest portion of the catch was taken in the Middle Atlantic Area and the smallest portion in the South Atlantic Area.

2. The most productive fishing grounds were essentially the same as in previous years

and included Chesapeake Bay and coastal waters northward to the southern shore of Long Island.

3. The large catch in 1959 was the result of the exceptionally abundant 1958 year class. This year class accounted for 90 percent of the catch in the Chesapeake Bay and South Atlantic Areas, 58 percent of the catch in the Middle Atlantic Area, and 5 percent of the catch in the North Atlantic Area. This was the first year since 1952 that age-1 fish contributed the major share of the catch in the Middle Atlantic Area and the first year on record that they constituted more than a fraction of 1 percent of the catch in the North Atlantic Area. The 1956 year class (age-3 fish) dominated the catch in the North Atlantic Area and the North Carolina fall fishery. In both fisheries, age-3-and-older fish continued to constitute only a small percentage of the catches.

4. The mean lengths and weights in each area except the North Carolina fall fishery were the smallest for any year from 1955 to 1959. Mean lengths and weights of age-1 fish in every area were the smallest for the period.

ACKNOWLEDGMENT

We wish to express our appreciation to the vessel captains and pilots who kept logs of daily fishing activities, and to plant owners and operators who provided facilities for processing the catch samples and made available their records of vessel landings.

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APPENDIX TABLES

Appendix Table 1.--Length-frequency distributions of Atlantic menhaden in samples from purse seine catches, South Atlantic Area, excluding the North Carolina fall fishery, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Fork length (mm.)	Age									Total
	1			2			3			
	M	F	T	M	F	T	M	F	T	
105-109	1	4	5	-	-	-	-	-	-	5
110-114	5	3	8	-	-	-	-	-	-	8
115-119	14	13	31	-	-	-	-	-	-	31
120-124	27	32	75	-	-	-	-	-	-	75
125-129	70	49	131	-	-	-	-	-	-	131
130-134	87	84	183	-	-	-	-	-	-	183
135-139	98	87	191	-	-	-	-	-	-	191
140-144	94	99	199	1	-	1	-	-	-	200
145-149	128	93	223	-	-	-	-	-	-	223
150-154	118	119	248	-	-	-	-	-	-	248
155-159	130	120	253	-	-	-	-	-	-	253
160-164	108	105	217	1	-	1	-	-	-	218
165-169	95	84	182	2	-	3	-	-	-	185
170-174	88	77	169	2	4	6	-	-	-	175
175-179	49	66	117	6	12	18	-	-	-	135
180-184	22	37	59	15	20	36	-	-	-	95
185-189	18	23	42	12	16	28	-	-	-	70
190-194	6	3	9	7	8	16	1	2	3	28
195-199	6	2	9	15	18	33	-	-	-	42
200-204	3	5	8	8	15	23	-	-	-	31
205-209	4	3	7	12	10	23	-	-	-	30
210-214	1	1	2	9	13	22	-	-	-	24
215-219	-	1	1	8	10	19	1	1	2	22
220-224	-	-	-	8	6	14	-	-	-	14
225-229	-	-	-	3	8	11	-	-	-	11
230-234	-	1	1	2	6	8	-	-	-	9
235-239	-	-	-	-	-	-	-	-	-	-
240-244	-	-	-	-	2	2	-	-	-	2
245-249	-	-	-	-	-	-	-	1	1	1
Total .	1172	1111	2370	111	148	264	2	4	6	2640

Appendix Table 2.--Length-frequency distributions of Atlantic menhaden in samples from purse seine catches, Chesapeake Bay Area, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Fork length (mm.)	Age												Total
	0			1			2			3			
	M	F	T	M	F	T	M	F	T	M	F	T	
110-114	-	-	-	-	-	2	-	-	-	-	-	-	2
115-119	-	-	-	-	-	1	-	-	-	-	-	-	1
120-124	-	-	-	2	1	3	-	-	-	-	-	-	3
125-129	1	-	1	1	1	4	-	-	-	-	-	-	5
130-134	1	-	1	14	20	36	-	-	-	-	-	-	37
135-139	1	1	2	19	35	61	-	-	-	-	-	-	63
140-144	1	3	4	47	86	145	-	-	-	-	-	-	149
145-149	1	1	2	116	145	266	1	-	1	-	-	-	269
150-154	1	-	1	209	264	481	-	-	-	-	-	-	482
155-159	5	-	5	202	248	451	-	-	-	-	-	-	456
160-164	2	4	6	237	291	528	1	-	1	-	-	-	535
165-169	1	-	1	209	196	406	-	-	-	-	-	-	407
170-174	2	3	5	169	161	330	1	-	1	-	-	-	336
175-179	-	-	-	105	118	223	-	-	-	-	-	-	223
180-184	-	-	-	63	81	145	2	-	2	-	-	-	147
185-189	-	-	-	44	47	91	2	-	2	-	-	-	93
190-194	-	-	-	24	23	47	3	2	5	-	-	-	52
195-199	-	-	-	7	9	16	3	6	9	-	-	-	25
200-204	-	-	-	1	1	2	15	6	22	-	-	-	24
205-209	-	-	-	-	-	-	34	19	53	1	-	1	54
210-214	-	-	-	-	-	-	54	36	90	1	1	2	92
215-219	-	-	-	-	-	-	44	42	86	-	1	1	87
220-224	-	-	-	-	-	-	26	46	72	-	1	1	73
225-229	-	-	-	-	-	-	26	18	44	2	3	5	49
230-234	-	-	-	-	-	-	5	11	16	-	2	2	18
235-239	-	-	-	-	-	-	3	4	7	4	8	12	19
240-244	-	-	-	-	-	-	1	-	1	-	1	1	2
245-249	-	-	-	-	-	-	1	-	1	1	1	2	3
250-254	-	-	-	-	-	-	-	-	-	2	1	3	3
Total . .	16	12	28	1469	1727	3238	222	190	413	11	19	30	3709

Appendix Table 3.--Length-frequency distributions of Atlantic menhaden in samples from purse seine catches, Middle Atlantic Area, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Fork length (mm.)	Age																					Total
	1			2			3			4			5			6			7			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
130-134	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
135-139	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
140-144	3	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
145-149	19	13	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37
150-154	27	28	57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	57
155-159	53	47	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	103
160-164	117	115	237	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	237
165-169	188	183	382	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	382
170-174	235	265	511	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	511
175-179	283	236	521	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	521
180-184	217	253	477	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	478
185-189	196	203	399	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	399
190-194	141	148	290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	290
195-199	98	139	237	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	237
200-204	60	72	132	1	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	135
205-209	30	47	77	5	4	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86
210-214	22	33	55	18	13	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86
215-219	7	15	22	49	47	96	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	120
220-224	6	8	14	142	107	250	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	268
225-229	5	6	11	278	174	452	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	468
230-234	2	-	2	283	257	540	18	19	37	-	-	-	-	-	-	-	-	-	-	-	-	579
235-239	1	-	1	238	246	484	36	28	64	-	-	-	-	-	-	-	-	-	-	-	-	549
240-244	-	-	-	142	173	317	73	60	133	-	-	-	-	-	-	-	-	-	-	-	-	450
245-249	-	-	-	62	87	149	104	98	202	-	-	-	-	-	-	-	-	-	-	-	-	351
250-254	-	-	-	27	53	80	80	110	190	1	-	1	-	-	-	-	-	-	-	-	-	271
255-259	-	-	-	14	21	35	47	112	159	-	-	-	-	-	-	-	-	-	-	-	-	194
260-264	-	-	-	8	12	20	52	79	131	-	-	-	1	-	1	-	-	-	-	-	-	152
265-269	-	-	-	4	4	8	18	37	55	-	-	-	-	-	-	-	-	-	-	-	-	63
270-274	-	-	-	1	-	1	19	15	34	-	-	-	-	-	-	-	1	1	-	-	-	36
275-279	-	-	-	-	1	1	9	12	21	-	-	-	-	-	-	-	-	-	-	-	-	22
280-284	-	-	-	-	1	1	11	10	21	-	-	-	-	-	-	-	-	-	-	1	1	23
285-289	-	-	-	-	1	1	11	8	19	1	1	2	-	1	1	-	-	-	-	-	-	23
290-294	-	-	-	-	1	1	5	11	16	-	-	-	-	-	-	-	-	-	-	-	-	17
295-299	-	-	-	-	-	-	7	8	15	2	1	3	-	-	-	-	-	-	-	-	-	18
300-304	-	-	-	-	-	-	2	4	6	2	1	3	-	-	-	-	-	-	-	-	-	9
305-309	-	-	-	-	-	-	3	2	5	2	1	3	-	-	-	-	-	-	-	-	-	8
310-314	-	-	-	-	-	-	1	2	3	-	1	1	-	-	-	-	-	-	-	-	-	4
315-319	-	-	-	-	-	-	-	-	-	1	1	2	2	-	2	-	-	-	-	-	-	4
320-324	-	-	-	-	-	-	-	-	-	-	4	4	1	-	1	1	-	1	-	-	-	6
325-329	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	1	-	1	3
330-334	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335-339	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-	2
340-344	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	1
345-349	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
350-354	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355-359	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
Total . .	1714	1813	3575	1273	1203	2480	502	620	1122	9	12	21	4	1	5	2	3	5	1	3	4	7212

Appendix Table 4.--Length-frequency distributions of Atlantic menhaden in samples from purse seine catches, North Atlantic Area, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Fork length (mm.)	Age																									Total
	1			2			3			4			5			6			7			8			9			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
170-174	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
175-179	4	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
180-184	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
185-189	7	6	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
190-194	5	3	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
195-199	4	8	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
200-204	7	7	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
205-209	6	12	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18
210-214	8	3	11	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
215-219	4	7	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
220-224	9	7	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
225-229	8	4	12	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
230-234	3	6	9	4	4	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17
235-239	5	4	9	11	11	22	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34
240-244	-	2	2	30	21	51	4	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	58
245-249	-	3	3	43	25	68	18	11	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100
250-254	-	-	-	46	23	70	28	23	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121
255-259	-	-	-	68	33	101	38	36	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175
260-264	-	-	-	58	60	118	80	53	133	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	251
265-269	-	-	-	41	40	81	93	81	174	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	257
270-274	-	-	-	21	39	60	138	116	255	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	316
275-279	-	-	-	18	26	44	108	101	209	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	254
280-284	-	-	-	5	17	22	118	114	232	3	5	8	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	264
285-289	-	-	-	5	6	11	97	133	230	2	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	247
290-294	-	-	-	2	8	10	65	124	189	1	6	7	4	-	4	-	-	-	-	-	-	-	-	-	-	-	-	210
295-299	-	-	-	-	1	1	70	109	179	6	7	13	1	4	5	-	-	-	-	-	-	-	-	-	-	-	-	198
300-304	-	-	-	-	-	-	24	79	103	17	9	26	4	2	6	-	2	2	-	-	-	-	-	-	-	-	-	137
305-309	-	-	-	-	-	-	9	39	48	22	16	38	3	-	3	2	1	3	-	-	-	-	-	-	-	-	-	92
310-314	-	-	-	-	-	-	3	17	20	19	16	35	9	3	12	8	1	9	-	-	-	-	-	-	-	-	-	76
315-319	-	-	-	-	-	-	2	6	8	15	30	45	6	6	12	3	5	8	3	-	3	-	-	-	-	-	-	76
320-324	-	-	-	-	-	-	1	3	4	6	35	41	6	15	21	8	7	15	6	2	8	-	-	-	-	-	-	89
325-329	-	-	-	-	-	-	1	1	2	3	16	19	2	15	17	9	12	21	5	3	8	2	1	3	-	-	-	70
330-334	-	-	-	-	-	-	-	-	-	2	14	16	3	17	20	8	24	32	2	19	21	-	4	4	-	-	-	93
335-339	-	-	-	-	-	-	-	-	-	-	5	5	-	8	8	1	9	10	-	7	7	1	6	7	1	-	1	38
340-344	-	-	-	-	-	-	-	-	-	1	1	2	-	3	3	-	11	11	1	11	12	1	5	6	-	-	-	34
345-349	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	6	6	-	3	3	-	3	3	-	-	-	13
350-354	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355-359	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	2
360-364	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
Total . .	72	76	148	354	315	670	899	1048	1948	98	168	266	40	73	113	39	78	117	17	46	63	4	21	25	1	-	1	3351

Appendix Table 5.--Length-frequency distributions of Atlantic menhaden in samples from purse seine catches, North Carolina fall fishery, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Fork length (mm.)	Age																										Total
	0			1			2			3			4			5			6			7			8			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
120-124	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
125-129	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
130-134	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
135-139	1	-	1	4	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
140-144	1	-	1	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
145-149	-	-	-	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
150-154	1	1	2	2	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
155-159	-	-	-	2	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
160-164	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
165-169	-	-	-	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
170-174	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
175-179	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180-184	-	-	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
185-189	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
190-194	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
195-199	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
200-204	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
205-209	-	-	-	2	2	4	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
210-214	-	-	-	2	1	3	3	5	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
215-219	-	-	-	2	1	3	2	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
220-224	-	-	-	1	-	1	4	10	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
225-229	-	-	-	1	1	2	2	5	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
230-234	-	-	-	-	-	-	3	4	7	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
235-239	-	-	-	-	-	-	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
240-244	-	-	-	-	-	-	5	4	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
245-249	-	-	-	-	-	-	4	4	4	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
250-254	-	-	-	1	1	2	7	3	10	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
255-259	-	-	-	1	-	1	6	3	9	7	2	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29
260-264	-	-	-	-	-	-	13	3	16	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18
265-269	-	-	-	-	-	-	17	7	24	11	3	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38
270-274	-	-	-	-	-	-	20	7	27	18	7	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52
275-279	-	-	-	-	-	-	8	18	26	40	16	56	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	83
280-284	-	-	-	-	-	-	14	9	23	54	58	112	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	136
285-289	-	-	-	-	-	-	7	15	22	52	49	101	4	-	4	-	-	-	-	-	-	-	-	-	-	-	-	127
290-294	-	-	-	-	-	-	3	11	14	49	50	99	3	3	6	-	-	-	-	-	-	-	-	-	-	-	-	119
295-299	-	-	-	-	-	-	1	-	1	39	63	102	3	2	5	-	1	1	-	-	-	-	-	-	-	-	-	109
300-304	-	-	-	-	-	-	-	-	-	20	46	66	5	6	11	2	1	3	-	-	-	-	-	-	-	-	-	80
305-309	-	-	-	-	-	-	-	-	-	12	30	42	7	8	15	-	-	-	-	-	-	-	-	-	-	-	-	57
310-314	-	-	-	-	-	-	-	-	-	4	14	18	7	15	22	4	-	4	3	-	3	-	-	-	-	-	-	47
315-319	-	-	-	-	-	-	-	-	-	1	8	9	8	15	23	1	1	2	2	1	3	1	-	1	-	-	-	38
320-324	-	-	-	-	-	-	-	-	-	2	1	3	2	9	11	3	4	7	7	4	11	-	-	-	-	-	-	32
325-329	-	-	-	-	-	-	-	-	-	-	1	1	1	9	10	2	7	9	6	1	7	-	1	1	-	-	-	28
330-334	-	-	-	-	-	-	-	-	-	-	-	-	1	5	6	-	3	3	3	8	11	-	1	1	-	1	1	22
335-339	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	4	4	-	3	3	-	1	1	-	-	-	9
340-344	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	3	3	-	2	2	-	1	1	-	2	2	9
345-349	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
350-354	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	2
Total . .	4	1	5	32	24	57	121	112	233	312	354	666	42	75	117	12	24	36	21	20	41	1	4	5	-	4	4	1164

Appendix Table 6.--Weight-frequency distributions of Atlantic menhaden in samples from purse seine catches South Atlantic Area, excluding the North Carolina fall fishery, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Weight (g.)	Age									Total
	1			2			3			
	M	F	T	M	F	T	M	F	T	
10-19	-	3	3	-	-	-	-	-	-	3
20-29	49	42	107	-	-	-	-	-	-	107
30-39	187	172	387	-	-	-	-	-	-	387
40-49	185	175	372	1	-	1	-	-	-	373
50-59	197	161	367	-	-	-	-	-	-	367
60-69	196	183	388	-	-	-	-	-	-	388
70-79	138	120	262	-	-	-	-	-	-	262
80-89	87	101	191	3	4	8	-	-	-	199
90-99	57	62	123	10	12	22	-	-	-	145
100-109	32	38	72	15	19	35	-	-	-	107
110-119	20	21	41	8	15	24	1	-	1	66
120-129	6	14	20	7	13	20	-	-	-	40
130-139	5	6	11	17	15	32	-	-	-	43
140-149	6	4	10	10	17	28	-	-	-	38
150-159	3	3	6	10	11	21	-	-	-	27
160-169	1	1	2	9	16	26	-	-	-	28
170-179	1	1	2	12	5	17	-	3	3	22
180-189	-	-	-	2	7	9	1	-	1	10
190-199	-	-	-	4	7	11	-	-	-	11
200-209	-	-	-	1	4	5	-	-	-	5
210-219	-	-	-	2	2	4	-	-	-	4
220-229	-	-	-	-	1	1	-	-	-	1
230-239	-	-	-	-	-	-	-	1	1	1
Total . .	1170	1107	2364	111	148	264	2	4	6	2634

Appendix Table 7.--Weight-frequency distributions of Atlantic menhaden in samples from purse seine catches, Chesapeake Bay Area, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Weight (g.)	Age												Total
	0			1			2			3			
	M	F	T	M	F	T	M	F	T	M	F	T	
20-29	-	-	-	1	1	6	-	-	-	-	-	-	6
30-39	2	-	2	21	31	58	-	-	-	-	-	-	60
40-49	2	4	6	132	208	357	1	-	1	-	-	-	364
50-59	1	1	2	356	418	787	-	-	-	-	-	-	789
60-69	2	1	3	281	364	646	1	-	1	-	-	-	650
70-79	6	3	9	250	265	515	-	-	-	-	-	-	524
80-89	1	2	3	177	157	334	1	-	1	-	-	-	338
90-99	2	1	3	102	118	220	-	-	-	-	-	-	223
100-109	-	-	-	71	64	136	2	-	2	-	-	-	138
110-119	-	-	-	39	49	88	7	4	11	-	-	-	99
120-129	-	-	-	23	32	55	4	2	6	-	-	-	61
130-139	-	-	-	12	16	28	13	14	28	1	-	1	57
140-149	-	-	-	3	2	5	35	22	57	1	-	1	63
150-159	-	-	-	1	2	3	55	25	80	-	-	-	83
160-169	-	-	-	-	-	-	33	34	67	-	4	4	71
170-179	-	-	-	-	-	-	28	31	59	-	2	2	61
180-189	-	-	-	-	-	-	18	30	48	-	-	-	48
190-199	-	-	-	-	-	-	9	13	22	1	1	2	24
200-209	-	-	-	-	-	-	6	9	15	2	6	8	23
210-219	-	-	-	-	-	-	6	4	10	3	1	4	14
220-229	-	-	-	-	-	-	-	-	-	1	1	2	2
230-239	-	-	-	-	-	-	1	-	1	-	1	1	2
240-249	-	-	-	-	-	-	2	-	2	-	2	2	4
250-259	-	-	-	-	-	-	-	-	-	1	1	2	2
260-269	-	-	-	-	-	-	-	1	1	-	-	-	1
270-279	-	-	-	-	-	-	-	1	1	1	-	1	2
Total . .	16	12	28	1469	1727	3238	222	190	413	11	19	30	3709

Appendix Table 8.--Weight-frequency distributions of Atlantic menhaden in samples from purse seine catches, Middle Atlantic Area, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Weight (g.)	Age																					Total
	1			2			3			4			5			6			7			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
30-39	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
40-49	11	4	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17
50-59	41	44	91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	91
60-69	112	92	218	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	218
70-79	222	243	479	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	479
80-89	315	298	617	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	617
90-99	311	306	623	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	623
100-109	240	266	507	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	508
110-119	174	175	350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	350
120-129	103	130	233	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	233
130-139	67	85	152	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	153
140-149	46	53	99	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	103
150-159	17	38	55	10	5	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71
160-169	23	30	53	16	11	27	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	81
170-179	11	25	36	26	19	45	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	83
180-189	9	7	16	75	59	134	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	153
190-199	2	4	6	125	84	209	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	220
200-209	4	2	6	160	117	277	3	5	8	-	-	-	-	-	-	-	-	-	-	-	-	291
210-219	1	2	3	155	128	283	8	5	13	-	-	-	-	-	-	-	-	-	-	-	-	299
220-229	1	2	3	157	151	308	16	11	27	-	-	-	-	-	-	-	-	-	-	-	-	338
230-239	2	1	3	154	150	304	25	17	42	-	-	-	-	-	-	-	-	-	-	-	-	349
240-249	1	1	2	124	122	246	21	22	43	-	-	-	-	-	-	-	-	-	-	-	-	291
250-259	-	-	-	85	99	184	31	33	64	-	-	-	-	-	-	-	-	-	-	-	-	248
260-269	-	-	-	57	73	131	40	36	76	-	-	-	-	-	-	-	-	-	-	-	-	207
270-279	-	-	-	41	56	97	44	45	89	-	-	-	-	-	-	-	-	-	-	-	-	186
280-289	-	-	-	21	35	57	47	40	87	-	-	-	-	-	-	-	-	-	-	-	-	144
290-299	-	-	-	24	22	46	43	66	109	-	-	-	-	-	-	-	-	-	-	-	-	155
300-309	-	-	-	10	20	30	39	51	90	-	-	-	-	-	-	-	-	-	-	-	-	120
310-319	-	-	-	7	12	19	20	47	67	1	-	1	-	-	-	-	-	-	-	-	-	87
320-329	-	-	-	8	10	18	26	38	64	-	-	-	1	-	1	-	-	-	-	-	-	83
330-339	-	-	-	5	9	14	18	37	55	-	-	-	-	-	-	-	-	-	-	-	-	69
340-349	-	-	-	3	4	7	27	39	66	-	-	-	-	-	-	-	-	-	-	-	-	73
350-359	-	-	-	3	4	7	17	13	30	-	-	-	-	-	-	-	-	-	-	-	-	37
360-369	-	-	-	2	1	3	13	17	30	-	-	-	-	-	-	-	-	-	-	-	-	33
370-379	-	-	-	-	1	1	3	18	21	-	-	-	-	-	-	-	-	-	-	-	-	22

Appendix Table 8.--Weight-frequency distributions of Atlantic menhaden in samples from purse seine catches, Middle Atlantic Area, 1959--Continued

(M - male, F - female, T - total, including specimens for which sex was not determined)

Weight (g.)	Age																					Total
	1			2			3			4			5			6			7			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
380-389	-	-	-	1	-	1	3	9	12	-	-	-	-	-	-	-	-	-	-	-	-	13
390-399	-	-	-	1	3	4	8	10	18	-	1	1	-	-	-	-	1	1	-	-	-	24
400-409	-	-	-	1	-	1	3	3	6	-	-	-	-	-	-	-	-	-	-	-	-	7
410-419	-	-	-	-	2	2	4	3	7	-	-	-	-	-	-	-	-	-	-	-	-	9
420-429	-	-	-	-	-	-	4	9	13	-	-	-	-	-	-	-	-	-	-	-	-	13
430-439	-	-	-	-	-	-	7	3	10	1	1	2	-	-	-	-	-	-	-	-	-	12
440-449	-	-	-	-	-	-	5	5	10	-	-	-	-	-	-	-	-	-	-	-	-	10
450-459	-	-	-	-	-	-	4	8	12	1	-	1	-	1	1	-	-	-	-	-	-	14
460-469	-	-	-	-	-	-	5	5	10	1	-	1	-	-	-	-	-	-	-	1	1	12
470-479	-	-	-	-	1	1	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-	5
480-489	-	-	-	-	1	1	3	1	4	-	1	1	-	-	-	-	-	-	-	-	-	6
490-499	-	-	-	-	-	-	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	4
500-509	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
510-519	-	-	-	-	-	-	1	5	6	-	-	-	-	-	-	-	-	-	-	-	-	6
520-529	-	-	-	-	-	-	-	1	1	2	1	3	-	-	-	-	-	-	-	-	-	4
530-539	-	-	-	-	-	-	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	3
540-549	-	-	-	-	-	-	-	1	1	1	-	1	-	-	-	-	-	-	-	-	-	2
550-559	-	-	-	-	-	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	2
560-569	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	2
570-579	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
580-589	-	-	-	-	-	-	-	2	2	-	-	-	1	-	1	-	-	-	-	-	-	3
590-599	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
600-609	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
610-619	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	1	-	-	-	2
620-629	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1
630-639	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-	1
640-649	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-	2
650-659	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	1	-	-	-	2
660-669	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
670-679	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
680-689	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
690-699	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1	1	-	-	-	2
700-709	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
710-719	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
720-729	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
730-739	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
740-749	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
750-759	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
760-769	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
770-779	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total . .	1714	1809	3571	1273	1202	2479	500	619	1119	9	12	21	4	1	5	2	3	5	1	3	4	7204

Appendix Table 9.--Weight-frequency distributions of Atlantic menhaden in samples from purse seine catches, North Atlantic Area, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Weight (g.)	Age																									Total
	1			2			3			4			5			6			7			8			9			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
80-89	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
90-99	3	3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
100-109	2	5	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
110-119	7	2	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
120-129	2	5	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
130-139	6	7	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
140-149	7	12	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
150-159	6	6	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
160-169	5	5	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
170-179	3	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
180-189	4	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
190-199	5	7	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
200-209	6	4	10	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
210-219	2	6	8	2	1	3	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
220-229	5	1	6	3	3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
230-239	2	3	5	12	8	20	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27
240-249	1	1	2	10	10	20	3	3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28
250-259	3	2	5	17	9	26	6	1	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38
260-269	-	1	1	17	21	38	6	2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47
270-279	-	-	-	22	13	35	12	7	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54
280-289	1	1	2	21	17	38	9	8	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	57
290-299	-	2	2	23	19	42	10	6	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60
300-309	-	-	-	17	18	36	22	15	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73
310-319	-	-	-	37	21	58	36	19	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	113
320-329	-	-	-	26	15	41	40	21	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	102
330-339	-	-	-	22	21	43	25	30	55	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99
340-349	-	-	-	22	24	46	42	31	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120
350-359	-	-	-	21	16	37	48	41	89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	126
360-369	-	-	-	14	14	28	37	34	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99
370-379	-	-	-	15	16	31	37	37	74	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	106
380-389	-	-	-	15	8	23	64	42	106	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	132
390-399	-	-	-	14	11	25	45	41	86	-	1	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	113
400-409	-	-	-	7	6	13	53	54	107	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	121
410-419	-	-	-	6	9	15	49	50	99	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	115
420-429	-	-	-	3	8	11	37	46	83	1	1	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	98
430-439	-	-	-	-	8	8	41	51	92	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	102
440-449	-	-	-	3	6	9	42	57	99	3	4	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	115
450-459	-	-	-	1	2	3	35	61	96	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	104
460-469	-	-	-	-	4	4	31	46	77	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	82
470-479	-	-	-	-	1	1	39	46	85	-	2	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	90
480-489	-	-	-	1	1	2	25	39	64	3	3	6	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	73
490-499	-	-	-	-	2	2	21	38	59	4	1	5	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	68
500-509	-	-	-	-	2	2	20	40	60	5	7	12	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	77

Appendix Table 9.--Weight-frequency distributions of Atlantic menhaden in samples from purse seine catches, North Atlantic Area, 1959--Continued

(M - male, F - female, T - total, including specimens for which sex was not determined)

Weight (g.)	Age																									Total
	1			2			3			4			5			6			7			8			9			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
510-519	-	-	-	1	-	1	12	28	40	6	3	9	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	51
520-529	-	-	-	1	-	1	12	23	35	10	3	13	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	50
530-539	-	-	-	-	-	-	7	22	29	7	7	14	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	45
540-549	-	-	-	-	-	-	5	25	30	6	3	9	-	2	2	1	1	2	-	-	-	-	-	-	-	-	-	43
550-559	-	-	-	-	-	-	2	15	17	7	4	11	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	31
560-569	-	-	-	-	-	-	5	16	21	7	8	15	2	-	2	3	1	4	-	-	-	-	-	-	-	-	-	42
570-579	-	-	-	-	-	-	2	11	13	5	11	16	3	3	6	4	1	5	-	-	-	-	-	-	-	-	-	40
580-589	-	-	-	-	-	-	4	8	12	2	9	11	2	2	4	-	1	1	-	-	-	-	-	-	-	-	-	28
590-599	-	-	-	-	-	-	3	11	14	5	9	14	2	2	4	2	1	3	-	-	-	-	-	-	-	-	-	35
600-609	-	-	-	-	-	-	2	4	6	6	10	16	4	3	7	2	4	6	1	-	1	-	-	-	-	-	-	36
610-619	-	-	-	-	-	-	1	1	2	-	6	6	1	4	5	1	1	2	1	-	1	-	-	-	-	-	-	16
620-629	-	-	-	-	-	-	2	2	4	3	10	13	3	4	7	2	3	5	2	-	2	-	-	-	-	-	-	31
630-639	-	-	-	-	-	-	-	5	5	2	2	4	1	3	4	3	4	7	1	-	1	-	-	-	-	-	-	21
640-649	-	-	-	-	-	-	-	2	2	3	6	9	-	4	4	4	1	5	3	-	3	-	1	1	-	-	-	24
650-659	-	-	-	-	-	-	-	2	2	-	4	4	-	5	5	1	3	4	1	1	2	-	-	-	-	-	-	17
660-669	-	-	-	-	-	-	-	1	1	1	2	3	1	-	1	4	5	9	2	5	7	-	1	1	-	-	-	22
670-679	-	-	-	-	-	-	-	2	2	2	6	8	-	5	5	3	3	6	-	2	2	-	-	-	-	-	-	23
680-689	-	-	-	-	-	-	-	1	1	1	6	7	2	9	11	2	6	8	1	2	3	-	-	-	-	-	-	30
690-699	-	-	-	-	-	-	-	1	1	1	7	8	1	3	4	2	1	3	2	5	7	1	-	1	-	-	-	24
700-709	-	-	-	-	-	-	-	-	-	1	3	4	1	1	2	1	6	7	2	1	3	-	2	2	-	-	-	18
710-719	-	-	-	-	-	-	-	-	-	-	1	1	-	5	5	-	6	6	-	4	4	1	2	3	-	-	-	19
720-729	-	-	-	-	-	-	-	-	-	-	3	3	-	5	5	-	3	3	-	2	2	-	2	2	-	-	-	15
730-739	-	-	-	-	-	-	-	-	-	1	3	4	1	2	3	-	3	3	-	1	1	-	2	2	-	-	-	13
740-749	-	-	-	-	-	-	-	-	-	-	3	3	-	2	2	-	1	1	-	5	5	-	2	2	1	-	1	14
750-759	-	-	-	-	-	-	-	-	-	-	1	1	-	4	4	2	3	5	-	3	3	-	-	-	-	-	-	13
760-769	-	-	-	-	-	-	-	-	-	-	5	5	-	1	1	2	4	6	1	1	2	-	2	2	-	-	-	16
770-779	-	-	-	-	-	-	-	-	-	1	1	2	-	1	1	-	3	3	-	2	2	1	1	2	-	-	-	10
780-789	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	4	4	-	-	-	1	2	3	-	-	-	8
790-799	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	2	2	-	2	2	-	-	-	6
800-809	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	2	-	-	-	-	-	-	3
810-819	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	1	1	-	2	2	-	-	-	-	-	-	5
820-829	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	2	2	-	-	-	-	-	-	4
830-839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
840-849	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-	2
850-859	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
860-869	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
870-879	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
880-889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
890-899	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
900-909	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	2
910-919	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
920-929	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
930-939	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
940-949	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
950-959	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
960-969	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
970-979	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
Total . .	72	76	148	354	314	669	895	1046	1942	98	168	266	40	73	113	39	77	116	17	45	62	4	21	25	1	-	1	3342

Appendix Table 10.--Weight-frequency distributions of Atlantic menhaden in samples from purse seine catches, North Carolina fall fishery, 1959

(M - male, F - female, T - total, including specimens for which sex was not determined)

Weight (g.)	Age																									Total
	0			1			2			3			4			5			6			7			8			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
20-29	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
30-39	-	-	-	3	3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
40-49	2	-	2	5	4	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
50-59	1	-	1	2	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
60-69	-	1	1	3	4	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
70-79	-	-	-	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
80-89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90-99	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
100-109	-	-	-	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
110-119	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
120-129	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
130-139	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
140-149	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
150-159	-	-	-	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
160-169	-	-	-	2	2	4	1	1	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
170-179	-	-	-	2	1	3	3	3	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
180-189	-	-	-	1	-	1	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
190-199	-	-	-	1	-	1	2	5	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
200-209	-	-	-	-	1	1	2	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
210-219	-	-	-	-	-	-	3	6	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
220-229	-	-	-	-	-	-	2	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
230-239	-	-	-	-	-	-	5	3	8	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
240-249	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
250-259	-	-	-	-	-	-	1	3	4	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
260-269	-	-	-	-	-	-	5	4	9	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
270-279	-	-	-	-	1	1	1	3	4	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
280-289	-	-	-	-	-	-	2	-	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
290-299	-	-	-	-	-	-	5	-	5	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
300-309	-	-	-	1	-	1	4	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
310-319	-	-	-	-	-	-	3	2	5	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
320-329	-	-	-	1	-	1	5	1	6	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
330-339	-	-	-	-	-	-	5	4	9	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
340-349	-	-	-	-	-	-	7	3	10	5	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
350-359	-	-	-	-	-	-	4	1	5	4	3	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
360-369	-	-	-	-	-	-	6	5	11	4	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17
370-379	-	-	-	-	-	-	7	1	8	10	4	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22
380-389	-	-	-	-	-	-	13	5	18	14	5	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37
390-399	-	-	-	-	-	-	7	8	15	9	6	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
400-409	-	-	-	-	-	-	6	4	10	14	8	22	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	34

Appendix Table 10.--Weight-frequency distributions of Atlantic menhaden in samples from purse seine catches, North Carolina fall fishery, 1959--Continued

(M - male, F - female, T - total, including specimens for which sex was not determined)

Weight (g.)	Age																									Total
	0			1			2			3			4			5			6			7			8			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
410-419	-	-	-	-	-	-	6	3	9	20	20	40	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	50
420-429	-	-	-	-	-	-	2	4	6	15	15	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36
430-439	-	-	-	-	-	-	3	6	9	27	15	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51
440-449	-	-	-	-	-	-	3	6	9	22	20	42	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	53
450-459	-	-	-	-	-	-	3	7	10	18	20	38	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	49
460-469	-	-	-	-	-	-	2	4	6	27	24	51	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	58
470-479	-	-	-	-	-	-	1	1	2	17	25	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44
480-489	-	-	-	-	-	-	1	3	4	14	23	37	6	1	7	-	-	-	-	-	-	-	-	-	-	-	-	48
490-499	-	-	-	-	-	-	-	2	2	21	20	41	3	-	3	-	1	1	-	-	-	-	-	-	-	-	-	47
500-509	-	-	-	-	-	-	-	1	1	15	16	31	4	4	8	-	-	-	-	-	-	-	-	-	-	-	-	40
510-519	-	-	-	-	-	-	-	-	-	14	19	33	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	36
520-529	-	-	-	-	-	-	-	-	-	9	19	28	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-	31
530-539	-	-	-	-	-	-	-	-	-	4	16	20	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	23
540-549	-	-	-	-	-	-	-	-	-	8	9	17	1	2	3	2	1	3	-	-	-	-	-	-	-	-	-	23
550-559	-	-	-	-	-	-	-	-	-	3	12	15	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-	18
560-569	-	-	-	-	-	-	-	-	-	2	10	12	3	2	5	3	-	3	1	-	1	-	-	-	-	-	-	21
570-579	-	-	-	-	-	-	-	-	-	-	11	11	2	5	7	1	-	1	1	-	1	-	-	-	-	-	-	20
580-589	-	-	-	-	-	-	-	-	-	2	8	10	3	3	6	1	-	1	-	-	-	-	-	-	-	-	-	17
590-599	-	-	-	-	-	-	-	-	-	-	4	4	3	3	6	-	1	1	1	-	1	-	-	-	-	-	-	12
600-609	-	-	-	-	-	-	-	-	-	-	4	4	1	4	5	-	1	1	3	-	3	-	-	-	-	-	-	13
610-619	-	-	-	-	-	-	-	-	-	2	-	2	3	4	7	-	-	-	1	-	1	-	-	-	-	-	-	10
620-629	-	-	-	-	-	-	-	-	-	1	4	5	3	4	7	-	1	1	1	1	2	1	-	1	-	-	-	16
630-639	-	-	-	-	-	-	-	-	-	-	1	1	-	8	8	2	1	3	1	-	1	-	-	-	-	-	-	13
640-649	-	-	-	-	-	-	-	-	-	-	1	1	1	3	4	2	1	3	-	2	2	-	-	-	-	-	-	10
650-659	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	1	2	3	2	2	4	-	-	-	-	-	-	9
660-669	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	2	2	3	2	5	-	-	-	-	-	-	8
670-679	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5	-	2	2	3	1	4	-	1	1	-	1	1	13
680-689	-	-	-	-	-	-	-	-	-	-	1	1	-	2	2	-	2	2	1	1	2	-	-	-	-	-	-	7
690-699	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	2	2	-	1	1	-	-	-	5
700-709	-	-	-	-	-	-	-	-	-	-	-	-	1	5	6	-	2	2	-	1	1	-	-	-	-	-	-	9
710-719	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3	-	1	1	-	1	1	-	-	-	-	1	1	6
720-729	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	2	-	1	1	-	-	-	-	-	-	4
730-739	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-	-	1	1	3
740-749	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	-	-	-	-	-	-	3
750-759	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	1
760-769	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	-	2	2	-	-	-	5
770-779	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
780-789	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
790-799	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-	-	-	-	2
800-809	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
810-819	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
820-829	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
830-839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
Total . .	4	1	5	32	24	57	121	111	232	312	354	666	42	75	117	12	24	36	21	20	41	1	4	5	-	4	4	1163

Appendix Table 11.--Mean fork length and weight of Atlantic menhaden in samples from purse seine catches, South Atlantic Area, excluding North Carolina fall fishery, 1959

Age Group	Sex 1/		
	Males	Females	Both
Fork length (mm.):			
1	152.4 (1125)	153.4 (1079)	152.9 (2204)
2	197.9 (111)	199.5 (148)	198.8 (259)
3	205.0 (2)	225.0 (4)	218.3 (6)
Weight (g.):			
1	60.8 (1123)	62.5 (1075)	61.6 (2198)
2	136.2 (111)	138.7 (148)	137.6 (259)
3	154.0 (2)	190.8 (4)	178.5 (6)

1/ Numbers of fish in parentheses.

Appendix Table 12.--Mean fork length and weight of Atlantic menhaden in samples from purse seine catches, Chesapeake Bay Area, 1959

Age Group	Sex 1/		
	Males	Females	Both
Fork Length (mm.):			
0	153.4 (16)	156.2 (12)	154.6 (28)
1	162.5 (1469)	161.3 (1727)	161.8 (3196)
2	213.8 (222)	217.1 (190)	215.3 (412)
3	233.7 (11)	233.3 (19)	233.5 (50)
Weight (g.):			
0	65.4 (16)	66.3 (12)	65.8 (28)
1	70.7 (1469)	69.0 (1727)	69.8 (3196)
2	160.3 (222)	167.9 (190)	163.8 (412)
3	206.6 (11)	203.3 (19)	204.4 (30)

1/ Numbers of fish in parentheses.

Appendix Table 13.--Mean fork length and weight of Atlantic menhaden in samples from purse seine catches, Middle Atlantic Area, 1959

Age Group	Sex 1/		
	Males	Females	Both
Fork Length (mm.):			
1	179.2 (1714)	180.8 (1813)	180.0 (3527)
2	232.5 (1273)	234.8 (1203)	233.6 (2476)
3	253.7 (502)	255.7 (620)	254.8 (1122)
4	297.3 (9)	315.3 (12)	307.6 (21)
5	304.8 (4)	292.0 (1)	302.2. (5)
6	331.0 (2)	311.0 (3)	319.0 (5)
7	325.0 (1)	328.0 (3)	327.2 (4)
Weight (g.):			
1	98.0 (1714)	101.0 (1809)	99.6 (3523)
2	227.2 (1273)	235.0 (1202)	231.0 (2475)
3	312.5 (500)	315.1 (619)	313.9 (1119)
4	487.8 (9)	584.8 (12)	543.2 (21)
5	553.0 (4)	445.0 (1)	531.4 (5)
6	632.0 (2)	577.3 (3)	599.2 (5)
7	621.0 (1)	657.0 (3)	648.0 (4)

1/ Numbers of fish in parentheses.

Appendix Table 14.--Mean fork length and weight of Atlantic menhaden in samples from purse seine catches, North Atlantic Area, 1959

Age Group	Sex 1/		
	Males	Females	Both
Fork Length (mm.):			
1	208.8 (72)	211.4 (76)	210.1 (148)
2	257.4 (354)	262.1 (315)	259.6 (669)
3	277.0 (899)	282.8 (1048)	280.1 (1947)
4	308.7 (98)	314.4 (168)	312.3 (266)
5	311.0 (40)	324.8 (73)	319.9 (113)
6	322.5 (39)	330.6 (78)	327.9 (117)
7	325.4 (17)	336.0 (46)	333.2 (63)
8	333.2 (4)	340.0 (21)	338.9 (25)
9	335.0 (1)	- -	335.0 (1)
Weight (g.):			
1	167.4 (72)	170.2 (76)	168.8 (148)
2	321.3 (354)	341.4 (314)	330.8 (668)
3	402.8 (895)	437.2 (1046)	421.3 (1941)
4	554.6 (98)	598.8 (168)	582.5 (266)
5	575.0 (40)	662.1 (73)	631.3 (113)
6	643.9 (39)	704.0 (77)	683.8 (116)
7	662.0 (17)	742.2 (45)	720.2 (62)
8	742.5 (4)	751.3 (21)	749.9 (25)
9	740.0 (1)	- -	740.0 (1)

1/ Numbers of fish in parentheses.

Appendix Table 15.--Mean fork length and weight of Atlantic menhaden in samples from purse seine catches, North Carolina fall fishery, 1959

Age Group	Sex 1/					
	Males		Females		Both	
Fork Length (mm.):						
0	138.2	(4)	154.0	(1)	141.4	(5)
1	179.4	(32)	172.8	(24)	176.6	(56)
2	262.7	(121)	260.7	(112)	261.7	(233)
3	286.4	(312)	292.5	(354)	289.6	(666)
4	307.5	(42)	313.9	(75)	311.6	(117)
5	314.8	(12)	327.7	(24)	323.4	(36)
6	323.0	(20)	331.4	(18)	327.1	(41)
7	318.0	(1)	334.8	(4)	331.4	(5)
8	-	-	341.0	(4)	341.0	(4)
Weight (g.):						
0	41.8	(4)	64.0	(1)	46.2	(5)
1	113.6	(32)	97.8	(24)	106.8	(56)
2	341.6	(121)	343.4	(111)	342.5	(232)
3	448.9	(312)	481.0	(354)	465.9	(666)
4	554.5	(42)	603.7	(75)	586.0	(117)
5	595.3	(12)	665.0	(24)	641.8	(36)
6	652.5	(21)	703.7	(20)	677.5	(41)
7	627.0	(1)	721.8	(4)	702.8	(5)
8	-	-	737.2	(4)	737.2	(4)

1/ Numbers of fish in parentheses.

MS #1338

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DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES
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